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Challenges of Testing in the Unbundled Loop Environment

Cooperation for Deployment of DSL Services

DSL Primed for Take Off...

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Analysts estimate 1.5 million businesses will switch from dial-up or ISDN access to DSL by 2002.

... backlog of 15,000 to 20,000 customers waiting for service.

"... now that I have it, I'm never giving it up!"

"And once you get used to DSL, going back to a 56k modem would be like trading my car in for a horse and carriage!"

... But there are problems

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DSL deployments hitting snags

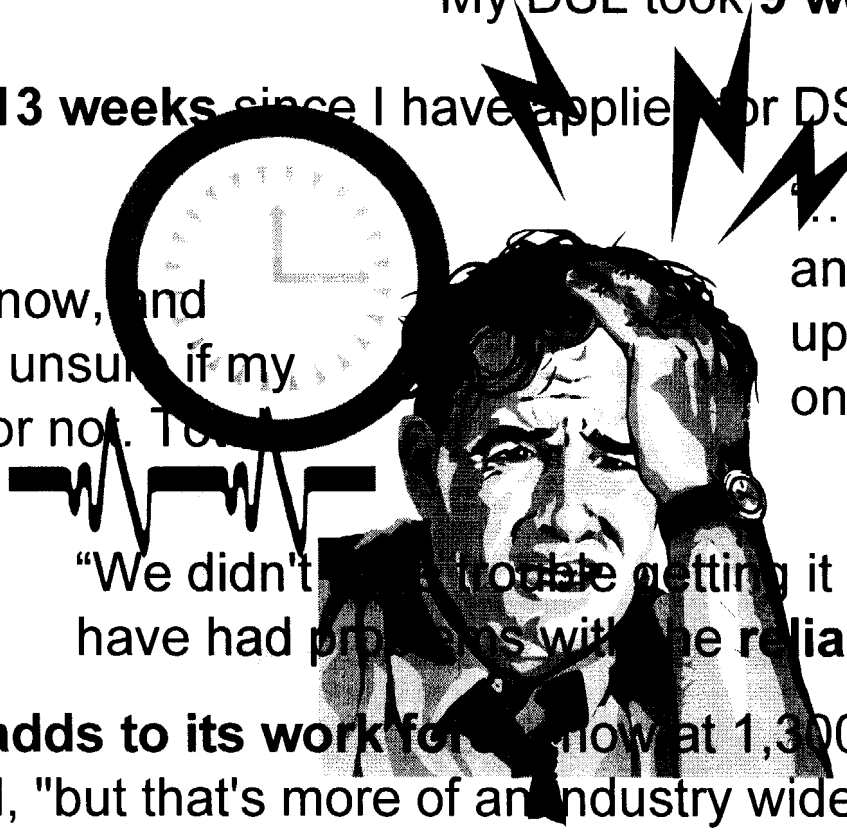
By John Rendleman, PC Week (http://www.zdnet.com)

"My DSL took **9 weeks** to get installed."

"It's been nearly **13 weeks** since I have applied for DSL service in Vancouver."

"... they took **9 weeks** and never hooked me up. They put the blame on everyone else."

"Over **2 months** now, and they're incredibly unsure if my house can get it or not. Total pain."



"We didn't have trouble getting it provisioned, but we have had problems with the **reliability of our DSL**"

"... continually **adds to its workforce** (now at 1,300 employees) to keep up with demand, "but that's more of an industry wide challenge than one that's individual to us,"

DSL is Different

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- New technology requires new tools and processes
- Need to help reduce the troublesome and long installation process

- Three major issues to cover
  - Remote loop access
  - Expanded physical layer testing
  - ILEC / CLEC process improvement tools

Remote Access to the Loop

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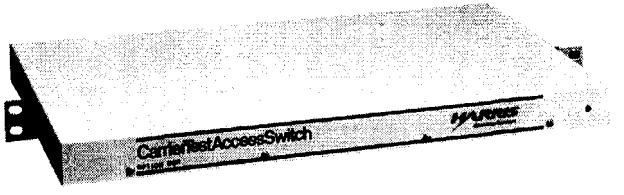
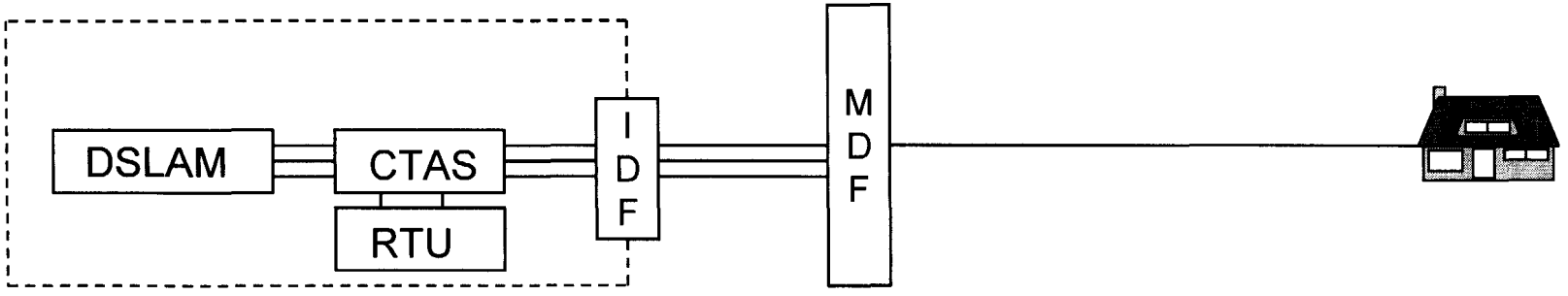
- Many DSLAMs don't have test access built-in
- For those DSLAMs that don't…
- Need separate Loop Access product

- Harris' Carrier Test Access Switch (CTAS)
  - Installed between DSLAM and MDF
  - Supports up to 128 pair
  - Daisy chained to scale easily





Remote Access to the Loop

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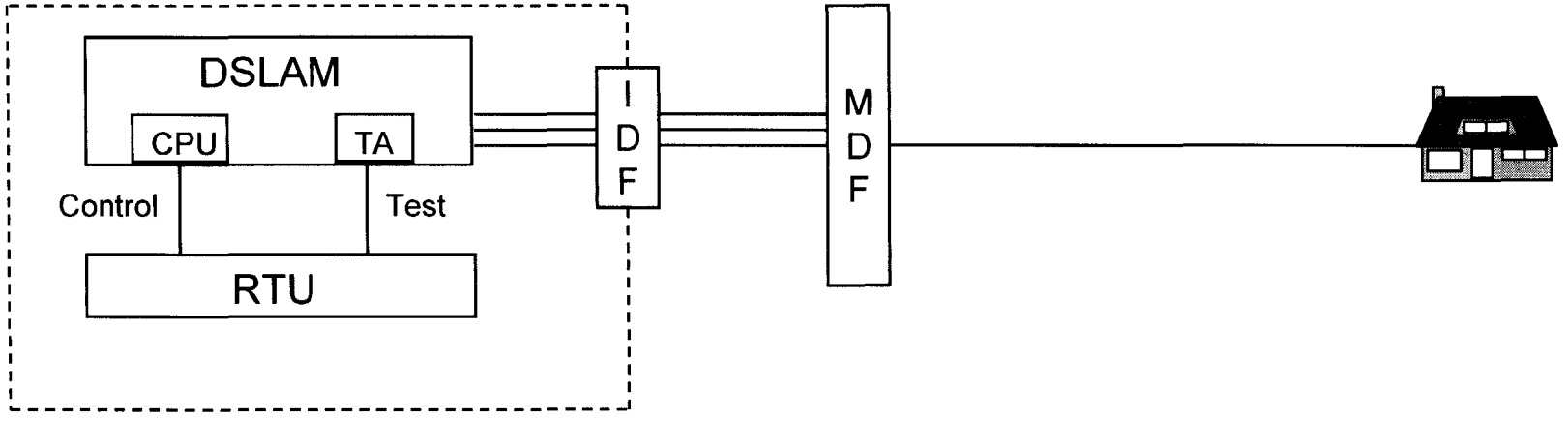
- But many DSLAMs do have test access built-in
- For those it's best to have a direct interface to the test equipment
- Similar to most switches and DLCs



Expanded Loop Testing

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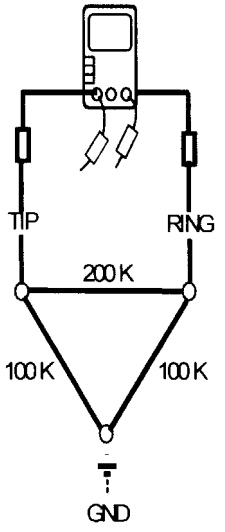
- DSL still relies on the local loop, so much of the physical layer testing is applicable and necessary
  - Accurate three terminal testing
  - AC/DC opens, shorts, grounds
  - Capacitive measurement
    - Length
    - Balance
  - Noise tests:
    - Longitudinal balance
    - Metallic
    - C-message
  - Load coil detection and spacing
  - Interactive tests with the field technician

Measurement Accuracy
2-Terminal Vs. 3-Terminal Test



CRAFT: DC SIGNATURE

KOHMS	VOLTS	
100.0		T-R
75.0	0.00	T-G
75.0	0.00	R-G

RTU: DC SIGNATURE

KOHMS	VOLTS	
200.0		T-R
100.0	0.00	T-G
100.0	0.00	R-G

High Frequency Testing

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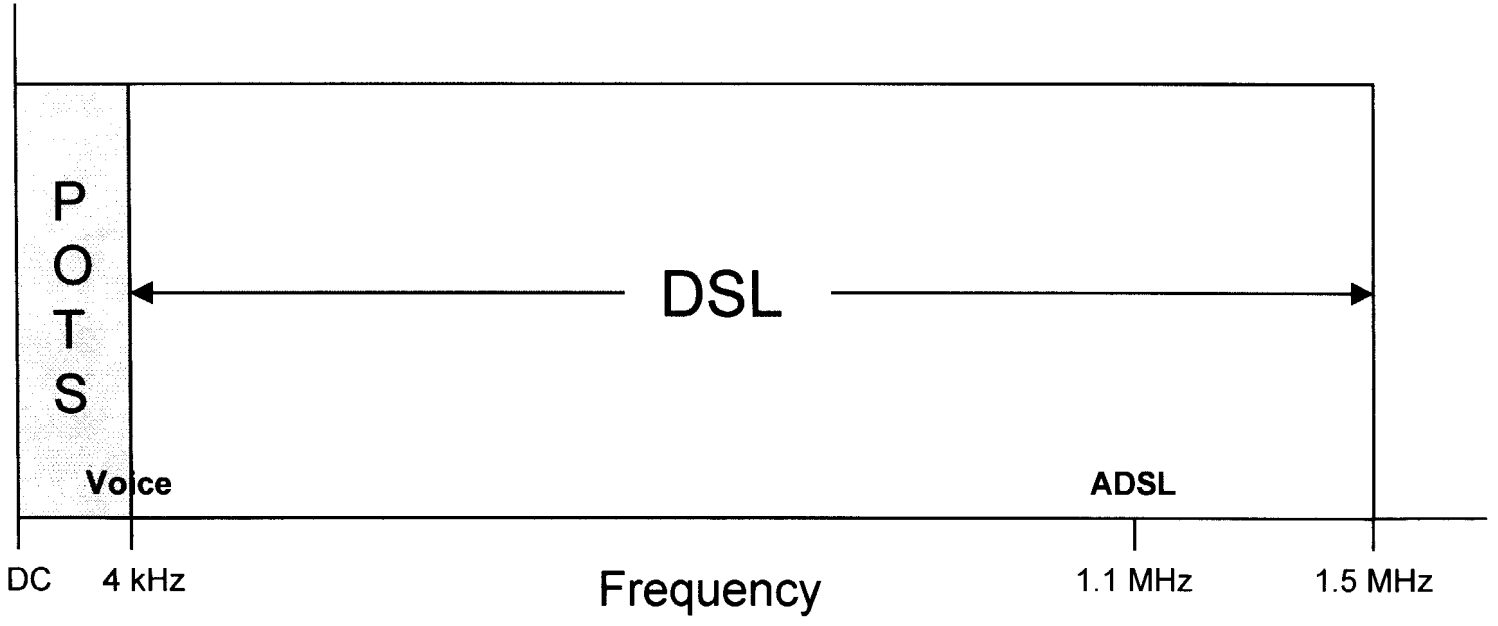
- DSL needs more…
- High frequency noise testing
  - Used to more accurately pre-qualify lines, finding high frequency noise that the RTU alone can't measure
  - Also used to help troubleshoot and recognize crosstalk noise



Bridged Tap Detection

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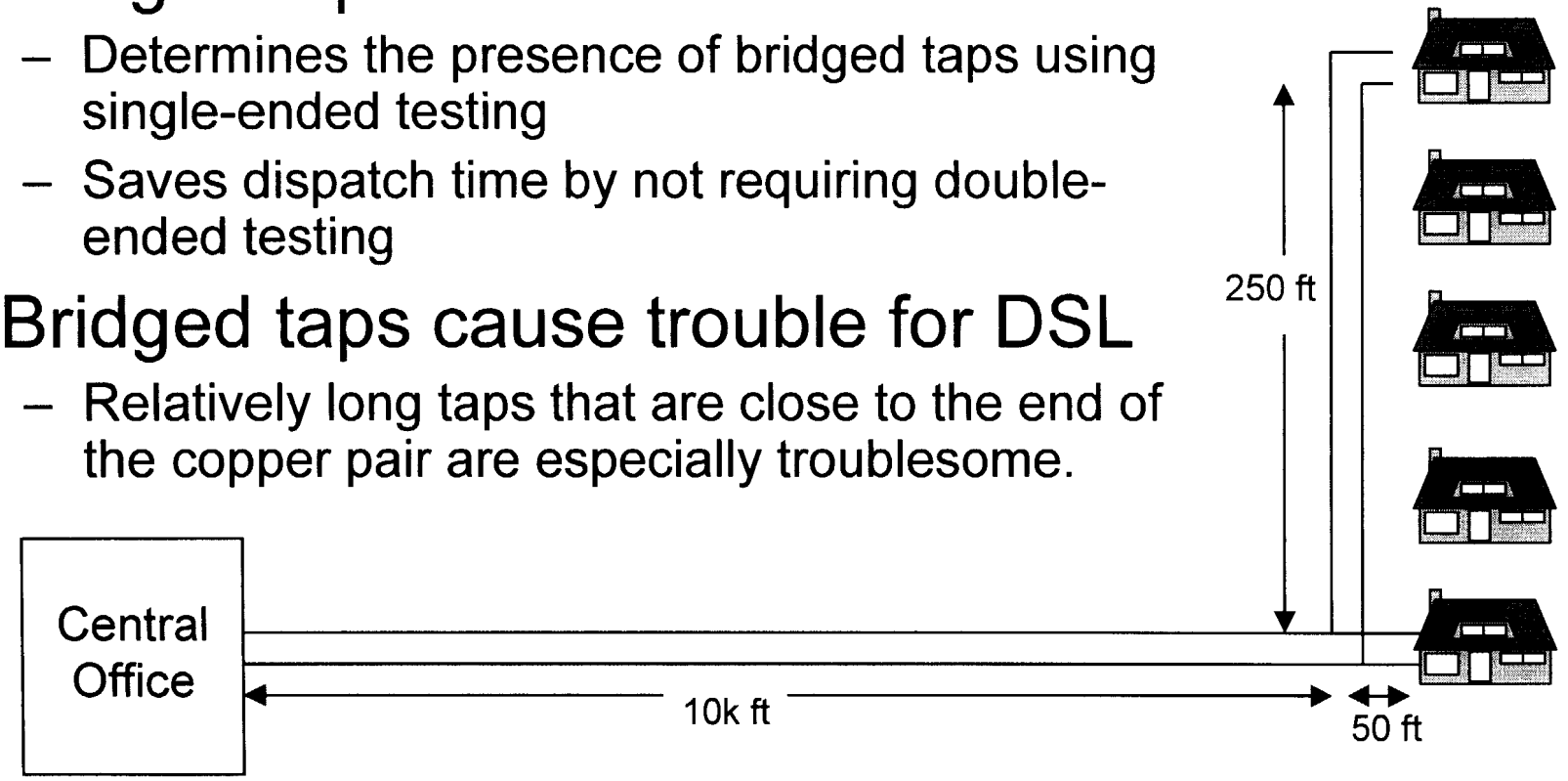
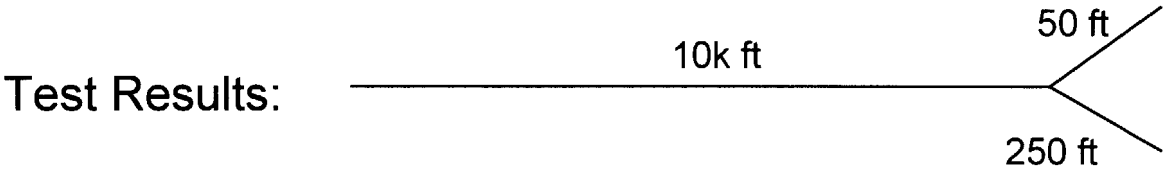
- Bridged tap detection and location
  - Determines the presence of bridged taps using single-ended testing
  - Saves dispatch time by not requiring double-ended testing
- Bridged taps cause trouble for DSL
  - Relatively long taps that are close to the end of the copper pair are especially troublesome.





ILEC / CLEC Process

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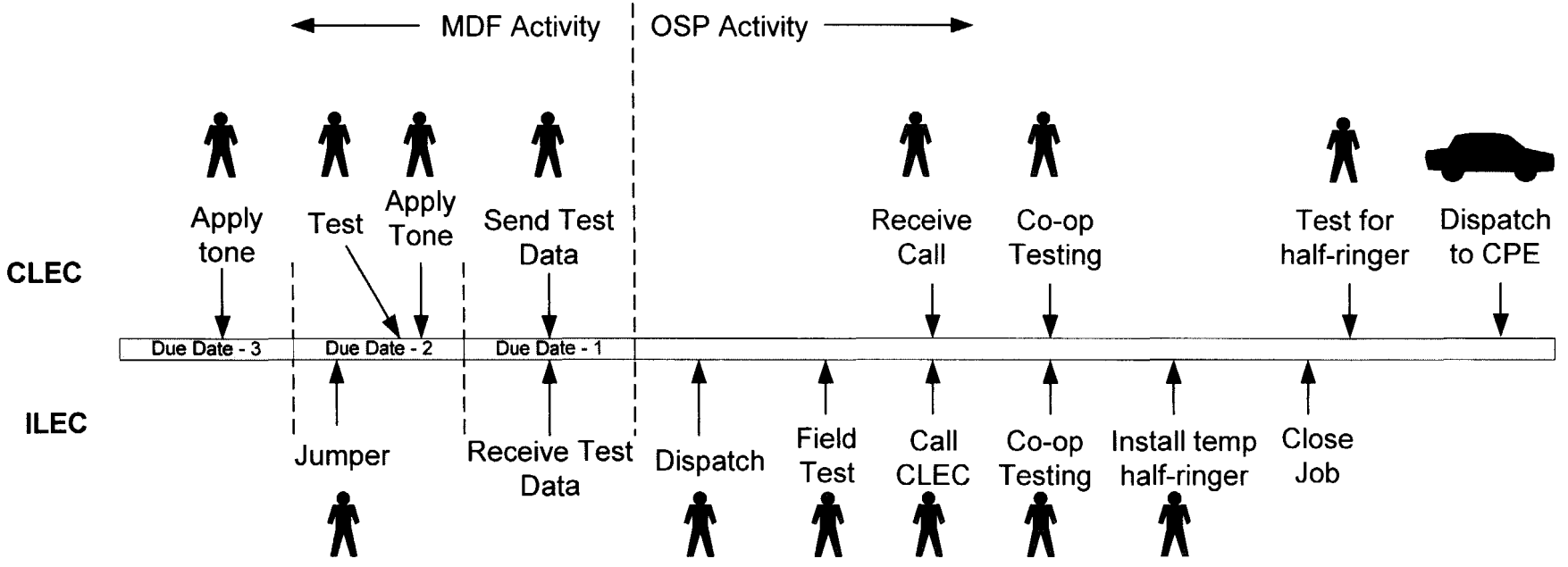
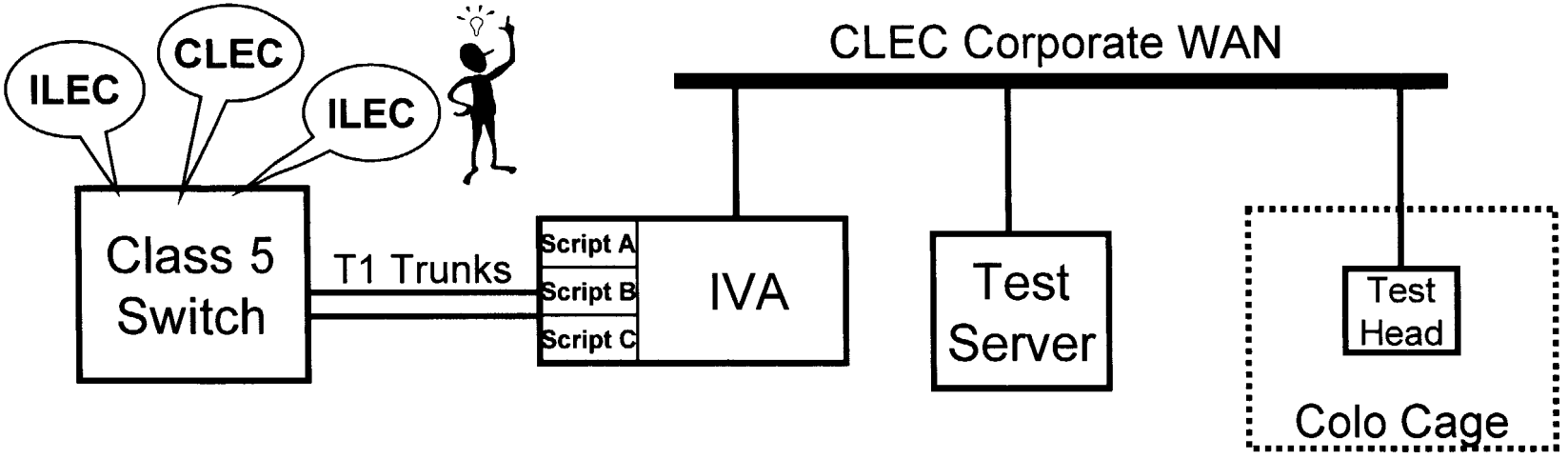
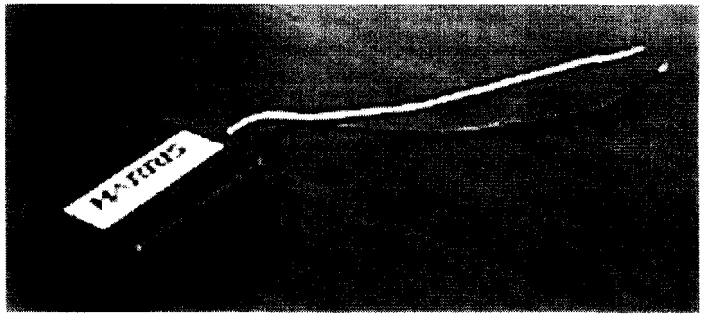
- CLEC / ILEC interactions still not too automated
- Inefficient operations - too many dispatches required
- A sample of the "old" process…

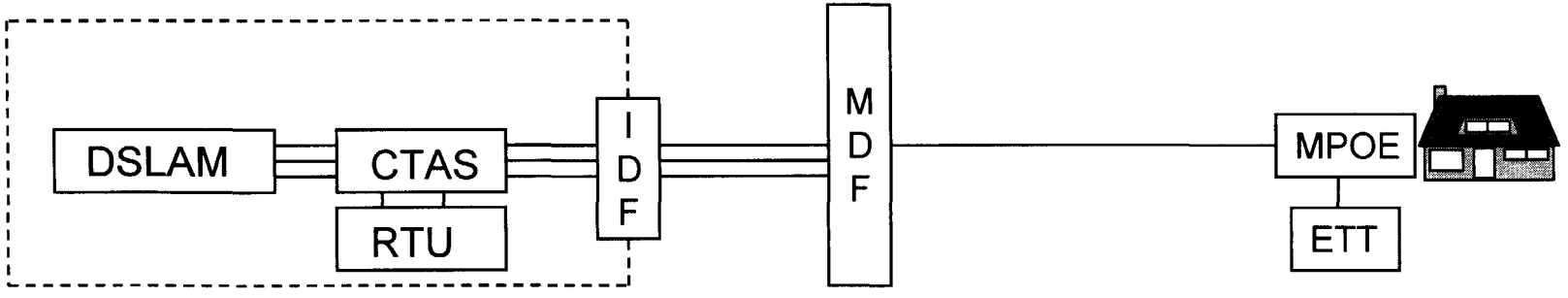


- Interactive Voice Access
  - Allows remote voice (touch-tone) access to the test system
  - Deployed by the CLEC - but can be used by either the ILEC or CLEC technicians
  - Vastly improves CLEC efficiency by minimizing the number of people needed at the operations center
  - ILECs more efficient since they have access to the loop
    - Tone on the line to help find the pair
    - Testing for troubleshooting during install



- Electronic Test Tag
  - Proves Circuit Continuity to Minimum Point Of Entry (MPOE)
  - Better than a Half-Ringer
    - No False Ringer Termination
    - Full Multimeter Testing of Loop in Inactive State
    - Positive Signature When Activated
  - Reusable on Subsequent Installations
  - Compatible with Current Harris RTU Hardware and Software





Old vs. New Process

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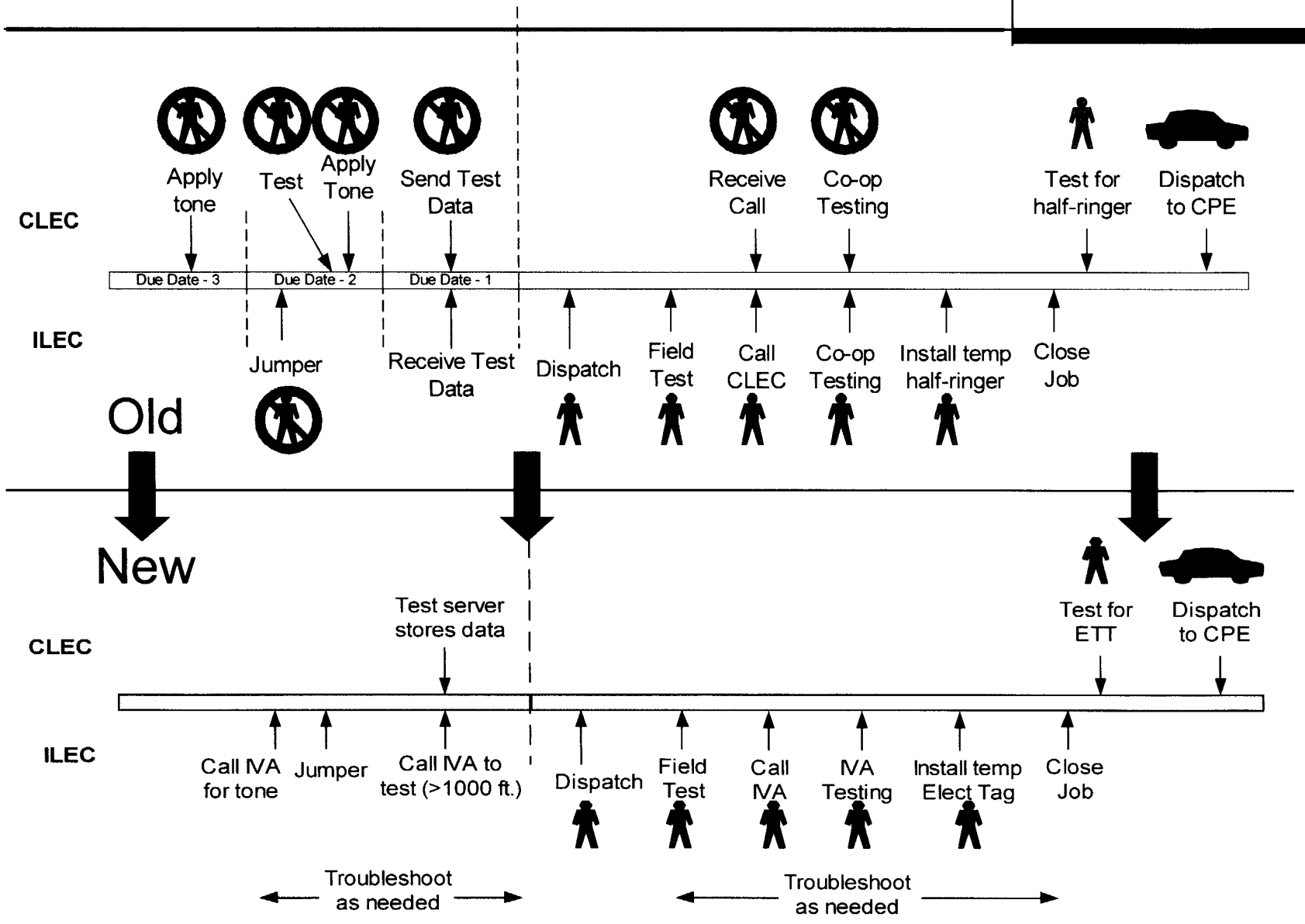

Summary

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- Harris offers a variety of products offered to CLECs and ILECs:
  - Comprehensive Line Testing
  - Remote Loop Access
  - IVA for field access to the system
  - ETT for positive line signature
- Helping to address the obstacles to fast and efficient DSL deployment, troubleshooting and maintenance

Thank you!

Questions?